UNIVERSITI PUTRA MALAYSIA

DEVELOPMENT OF MS ACCESS 97 BASED WILDLIFE DATABASE: AVES AND MAMMALIA OF MALAYSIA

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By

SYAMSUL HERMAN B HJ. MOHAMMAD AFANDI

Thesis Submitted in Fulfilment of the Requirement for the Degree of Master of Science in the Faculty of Forestry Universiti Putra Malaysia

August 2001

Dedication

Dedicated to
My loving parents
And those who love me

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science

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August 2001

Chairman : Dr. Mohamed Zakaria b. Hussin

Faculty : Forestry

Development of databases has become a major activity in computer industry. Database plays significant role in many fields which slowly has its impact on wildlife management. With a reliable database, storage of information on wildlife is proper, safe and well managed. The main objective of the study is to develop a computerized database on wildlife in Malaysia. The database contained 966 species which included 320 species of mammals and 646 species of birds in Malaysia. Both primary data and secondary data were compiled in the database. Important components used in the database are such as scientific name, local name, common English name, order, family, grouping, brief description, photo, status, protection feeding structures and habitat of the wildlife.

Designing the database comprised of three major phases; data collection, data design and system design. In data design, an Entity Relationship model was designed to

describe entities, relationship and attributes of the 'Wildlife Database'. Four entities were identified namely Wildlife, Habitat, Feeding Structure and Protection. In the system design phase, major designing works were concentrated on data flow, menu system, form design and graphical user interface. Selected software was *Microsoft Access 97* as the storage and application software. Upon completion, the database run on PC with at least Pentium 100 Mhz, 64 MB RAM Memory, CD ROM 20 X and VGA Card. It is necessary to have *Microsoft Windows 95* and *Microsoft Access 97* to run the application.

The need for researchers, students, lecturers or even normal user to retrieve valuable information on wildlife quickly and accurately can be achieved through this project. Futhermore, with the development of the 'Wildlife Database of Malaysia', it is hoped that it will facilitate the management of wildlife in Malaysia or even in neighbouring countries.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk mendapatkan ijazah Master Sains

PEMBINAAN PENGKALAN DATA HIDUPAN LIAR BERASASKAN MS ACCESS 97 : AVES AND MAMALIA MALAYSIA

Oleh

SYAMSUL HERMAN B. HJ. MOHAMMAD AFANDI

Ogos 2001

Pengerusi : Dr. Mohamed Zakaria b. Hussin

Fakulti : Perhutanan

Pembinaan pengkalan data kini menjadi satu daripada aktiviti utama di dalam industri komputer. Pengkalan data memainkan peranan yang penting di dalam pelbagai bidang dan sedikit demi sedikit ia juga memberi kesan kepada pengurusan hidupan liar. Dengan adanya pengkalan data hidupan liar, penyimpanan maklumat menjadi lebih sempurna dan selamat. Objektif utama kajian ini adalah untuk membina sebuah pengkalan data hidupan liar di Malaysia yang berkomputer. Sejumlah 966 spesies hidupan liar yang terdiri daripada 320 spesies mamalia dan 646 spesies burung yang terdapat di Malaysia telah dirangkumkan ke dalam pengkalan data ini. Data terpilih adalah daripada data primer dan juga sekunder. Komponen-komponen penting di dalam pengkalan data adalah nama saintifik, nama tempatan, nama am Inggeris, order, famili, kumpulan, keterangan ringkas, gambar, status, perlindungan, struktur kaedah pemakanan dan habitat.

Proses rekabentuk pengkalan data hidupan liar ini terdiri daripada tiga fasa utama: kutipan data, rekabentuk struktur data dan rekabentuk system. Di dalam rekabentuk struktur data, satu model yang dipanggil Model Perhubungan Entiti telah dibina untuk menerangkan perhubungan di antara entiti dan atribut-atribut yang digunakan dalam Pengkalan Data Hidupan Liar Malaysia. Empat entiti utama telah dikenalpasti yang mana dinamakan sebagai entiti Hidupan Liar, Habitat, Struktur Pemakanan dan Perlindungan. Di dalam fasa rekabentuk sistem pula, kerja-kerja utama menjurus kepada fungsi-fungsi sistem, sistem menu, rekabentuk asas paparan dan rekabentuk paparan pengguna. *Microsoft Access 97* telah dipilih sebagai perisian untuk membina aplikasi dan juga sebagai penyimpanan data untuk Pengkalan Data Hidupan Liar ini.

Keperluan perkakasan untuk Pengkalan Data Hidupan Liar Malaysia ini adalah sekurang-kurangnya pada komputer peribadi dengan ciri-ciri Pentium 100 Mhz, memori 64 Mb RAM, CD ROM 20 X dan kad VGA.

Projek ini bertujuan untuk membantu penyelidik, pelajar, pensyarah malahan orang awam untuk mendapatkan maklumat-maklumat mengenai hidupan liar dengan lebih cepat dan tepat. Diharapkan dengan dengan pembinaan 'Pengkalan Data Hidupan Liar Malaysia' ini, ia akan dapat membantu pihak-pihak yang berkaitan dengan pengurusan hidupan liar di Malaysia mahupun negara-negara jiran.

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In the name of Allah, the Most Beneficent and The Most Merciful

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Finally, thanks to all that have involved indirectly in the completion of the project.

I certify that an Examination Committee met on 2nd August 2001 to conduct the final examination of Syamsul Herman b. Hj. Mohammad Afandi on his Master of Science thesis entitled "Development of MS Access 97 Based Wildlife Database: Aves and Mammalia of Malaysia" in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The Committee recommends that the candidate be awarded the relevant degree. Members of the Examination Committee are as follows:

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This thesis submitted to the Senate of Universiti Putra Malaysia has been accepted as fulfilment of the requirement for the degree of Master of Science.

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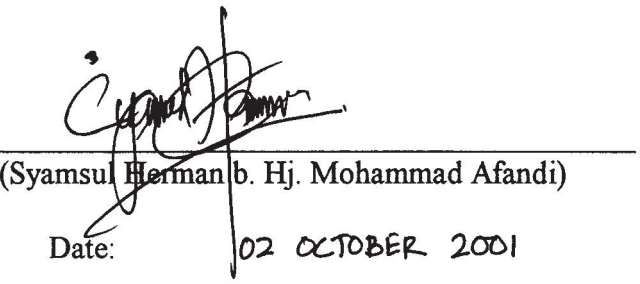
Date: 13 DEC 2001

DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations which, have been duly acknowledged. I declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions



(Syamsul Herman b. Hj. Mohammad Afandi)

Date: 02 OCTOBER 2001

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LIST OF ABBREVIATIONS

ACIAR	Australian Centre for International Agricultural Research
AI	Artificial Intelligence
CABI	CAB International
CD-ROM	Compact Disc – Read Only Memory
CIFOR	Center for International Forestry Research
DFID	Departmental for International Development
DBMS	Database Management System
EIA	Environmental Impact Assessment
ER Model	Entity-Relationship Model
EU	European Union
FDSM	Forestry Department Peninsular Malaysia
FRIM	Forest Research Institute Malaysia
GIS	Geographical Information System
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
GUI	Graphical User Interface
HTML	Hypertext Markup Language
ICRAF	International Center for Research in Agroforestry
INBAR	International Network for Bamboo and Rattan
IT	Information Technology
ITTO	International Tropical Timber Organisation
MB	Megabyte
OFI	Oxford Forestry Institute

PROSEA	Plant Resources of South East Asia
PC	Personal Computer
RAM	Random Access Memory
SIS	Sawmill Information System
USAID	United States Agency for International Development
USDA-FS	United States Department of Agriculture-Forest Service
VGA	Video Graphic Array
VBA	Visual Basic for Application

CHAPTER ONE

INTRODUCTION

1.0 Introduction

Rainforest in Malaysia has the richest collection of flora and fauna comprising of 1,200 species of birds, 243 species of mammals, 294 species of reptiles, 171 species of amphibians and 449 species of freshwater fishes (Groombridge, 1996). There has been a total of 638 species of birds from 78 families recorded in Peninsular Malaysia and Singapore (Strange and Jeyarajasingam, 1993). 70 % of the species are residents while the rest are passage, migrants, winter visitors or vagrants.

The statistics show that wildlife in Malaysia is very diverse. Books, journals and magazine are the main sources of information on those species. Nowadays, computer related products are becoming another alternative in seeking information. Products such as software, web sites, on-line databases and a few more are the current trend of information resources. Some computer software allows users to interact providing alternatives in getting information. With computer applications, changes on information are possible and any new information can be updated easily.

The scope of this study is the development a database on birds and mammals of Malaysia so that it will benefit organizations or individuals in this field. Figure 1.1 shows the concept of the wildlife database development in this study.

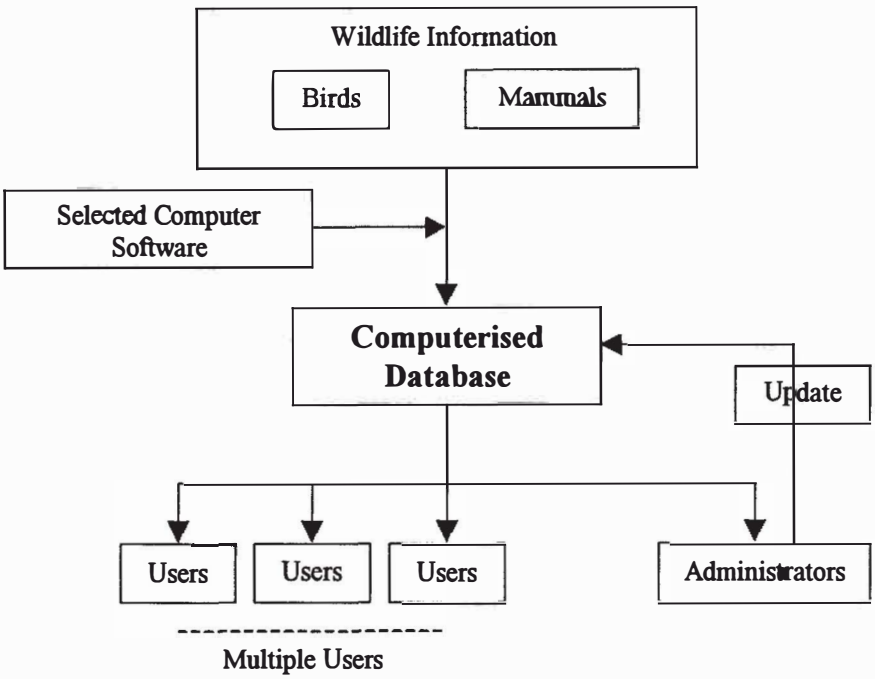

Figure 1.1 : Concept of the Study

Through the use of computer software, the database to be developed is a computer-based wildlife database. The benefit of this computerised database, is that it will serve more users and facilitate new searching methods. In addition, the database is capable to be updated if there are any changes and new findings in the future.

1.1 Problem Statement

Information and data on wildlife are likely to be found scattered in books, journals, research papers and other different kind of publications. In getting information on wildlife, one will have to access books and journals and scan through each of them. This method is costly and time consuming.

Information in books is often not updated unless latest editions or volumes are released. The process of releasing a publication also incur time and costs. The same problem also apply when there are sudden changes to the data. On the other hand, limited number of publications limits the number of users. It is quite hard to share a book to a large amount of users that seek different information.

There are commercial software on wildlife in the market such as AVISys – Superior Birding Software, LANIUS Excalibur 2000 - The Ornithological and some others. However, most of the software are on general wildlife species and not directly focused on Malaysian wildlife. Furthermore, almost all of the software are owned by companies that developed them, hence it is not possible for users to make changes onto them.

Thus, it is from this perspective that this research focuses on the development of 'Wildlife Database of Malaysia'. Information and data on Malaysian wildlife from published materials will be pooled together in a

computerised database. The concept of the problem and benefit of the study are explained in Figure 1.2.

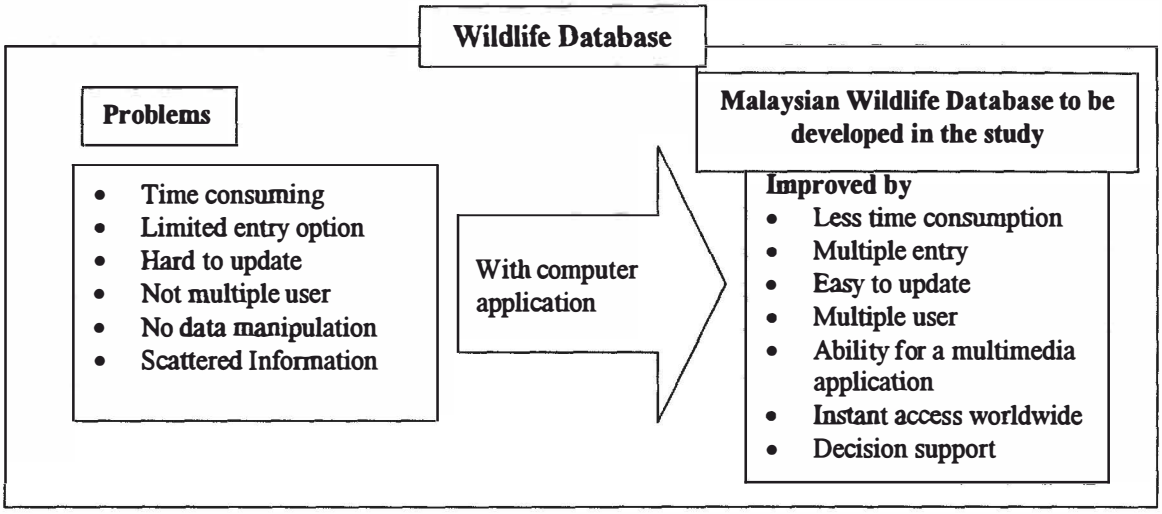

Figure 1.2 : Graphical Framework of the Problems and Benefit of the Project

1.2 Justification

Windows applications are used widely in Malaysia and all over the world (Mohd. Saidy, 1997). Griffin and Caprata (1977) also suggested that computer programme should be introduced in daily operation and management to reduce human errors and decrease compilation time with increase reliability.

In this study, the database system established using windows-based software so that it can easily installed and user-friendly. The simple system design and functions were also suitable even for users with basic computer knowledge. Commands are preset and users activities are only by clicking.

Main target users of the database are researchers, students and lecturers in wildlife field. The database provides basic information such as names, habitat, protection, description and some other information which also suitable for individual with some basic knowledge on wildlife.

The need for researchers, students, lecturers or even normal users to retrieve valuable information on wildlife quickly and accurately can be achieved through this project. Furthermore, users of the database will be exposed to computer applications parallel to the current information technology development.

Through the development of 'Wildlife Database of Malaysia', finding information on wildlife will be much faster, easier and cheaper. Accordingly, information on wildlife will be easy to update, possible to be accessed by multiple users and can enhance the process of learning on wildlife.

1.3 Objective of the Study

The objectives of the study are:

- To compile data on wildlife with special reference to mammals (Mammalia) and birds (Aves) of Peninsular Malaysia and Borneo.
- To design a computerised database of the selected wildlife compilation
- To design and develop a user friendly graphical user interface system that operate the computerised database

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

The development of databases is one of the most important data-processing activities presently. Data[1] is increasingly regarded as a vital resource which must be organised to maximise their value. This create growing demand for databases services, which collect, organise and sell data. With the enhancement of information technology, it is now possible to store drawing, photographs, sounds and movies which was not possible to store on papers.

Furthermore, it is becoming cheaper to store data on computer files than to store on paper. For past decades, the falling cost per bit is related to the fact that increasing quantities of data are being stored. By looking at the trend of decreasing cost to store data digitally, it is clear that data banks plays a major role in the industry. It is an important task to identify data items to a running corporation and to determine where and how are they be best recorded and stored.

[1] The word *data* will be used for singular and plural, which is common in database literature. Context will determined whether it is singular or plural. In English, *data* is used as plural, whereas *datum* for singular

2.1 Concept of a Database

A simple idea of a database is that an organisation keeps all its processable items of data in a large reservoir in which a diversity of data users can go fishing. The storage in which all the data are kept may be in one location or multiple locations, which is also possibly interconnected by telecommunications. Like the base of a structure, a database may be thought as a structure or foundation. It is an accumulation of information that supports research or a pool of information where one can pull out relevant clumps of facts.

However, not all database need to be computerised. Personal address books, filing cabinets, phone books, library card catalogue, index of book references, are examples of databases that being used everyday and usually without the help of computer. However, with computer application, it is easier to develop control over information. It is faster to conduct a certain task. There are things that could not be done without a computer such as sorting address book by name, postcode, selecting people through date of birth and so on. Hence, it is an advantage if the data is accessible by a variety of computer programmes.

2.1.1 Definition of Database

A database is a collection of stored information organised for fast and effective manipulation and retrieval (Emerson and Darnovsky, 1984).